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ABSTRACT

Research on the impact of higher education on the individual and society is reviewed, and the strengths and weaknesses of the research are identified. Attention is directed to the impact of higher education on individual students, the national economy, local and regional economies, teaching faculty and librarians (309 men and 68 women) employed by a public four-year college in fall 1981 were investigated. Four research available on the impact of higher education on the national affected salary significantly; while tenure, and often inconclusive, it is suggested that the investment (e.g., tuition, affected salary significantly; while tenure, race, and citizenship did not. and often inconclusive, it is suggested that the investment (e.g., tuition, time out) in human capital yields comparable return (income after completion) to investment in other capital. More studies have been conducted on the impact of colleges and universities on their respective locales or regions. Taking into account cost to the community for providing services to a college and its employees, these studies seem to demonstrate that benefits derived from supporting a college outweigh the costs to the community. Inferences can be drawn from the individual level to the societal level concerning the effects of higher education. (Author/SW)

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THE IMPACT OF HIGHER EDUCATION:

An Analysis of the Research

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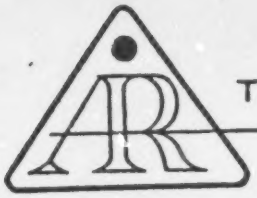

THE ASSOCIATION FOR INSTITUTIONAL RESEARCH

This paper was presented at the Twenty-Third Annual Forum of the Association for Institutional Research held at the Sheraton Centre in Toronto, Ontario, May 23-26, 1983. This paper was reviewed by the AIR Forum Publications Committee and was judged to be of high quality and of interest to others concerned with the research of higher education. It has therefore been selected to be included in the ERIC Collection of Forum papers.

D. R. Coleman, Chairman
Forum Publication
Advisory Committee

SYNOPSIS

This report gathers and synthesizes the research on the impact of higher education on the individual and society. Discussing the parameters and underlying theories within which the studies in this area have been conducted, the article summarizes the findings and evaluates the various strengths and weaknesses of the research.

Conceptually, impact can be divided into four major areas: 1) impacts on individual students, 2) impacts on the national economy, 3) impacts on local and regional economies, and 4) general societal impacts. Probably the best documented of the four impacts is the impact on students. Higher education has a profound effect on students, in economic, cognitive and attitudinal terms. Based on the review of ample literature, the article discusses nine specific impact areas.

There is considerably less research available on the impact of higher education on the national economy. Economists have proposed the Human Capital Development theory in order to measure the impact of higher education on the national level. While estimates tend to be approximate and often inconclusive, it is suggested that the investment (e.g. tuition, time out) in human capital yields comparable returns (income after completion) to investment in other capital.

More studies have been conducted on the impact of colleges and universities on their respective locales or regions. Taking into account cost to the community for providing services to a college and its employees, these studies seem to demonstrate that benefits derived from supporting a college outweigh the costs to the community.

With respect to the impact of higher education on society, no empirical studies per se are available; however, by drawing inferences from the micro level (impact on the individual) to the macro level (society), one can conclude that colleges and universities have a profound and long-lasting impact upon the country.

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The Impacts of Higher Education

INTRODUCTION

Webster defines impact as "a concentrated force producing change." Higher education impacts individuals and society in a variety of ways. Impacts are monetary and non-monetary, personal and societal. Frequently, a primary type of impact leads to a secondary type. For example, people who are college educated seek out preventive medicine more frequently than those who are not college graduates. This clearly has an effect on the better health of individuals. It also has societal effects in terms of a healthier, more productive workforce, and monetary effects due to the savings from preventive medicine versus the cost of curing.

Although the various impacts are intertwined, it is necessary to discuss them separately, at least initially. Therefore, this report will be divided into four sections detailing the four basic areas of impact. However, the reader should be cognizant of the fact that any given impact may have a ripple effect.

Briefly, the four impact areas are: 1) individual, 2) national economy, 3) local or regional economy, and 4) societal. Perspectives and methodologies of researchers in these areas differ depending upon their respective disciplines. While psychologists and social psychologists are usually involved in research in individual and societal effects, economists deal with the two economic effects. Non-monetary research is collected primarily through aptitude/achievement tests and attitudinal surveys, and tends to be somewhat more subjective than research on economic impact. Economic figures come from census data, the Bureau of Labor Statistics, and other large (mostly governmental) studies. Their data are reasonably objective, but problems of interpretation remain.

There is a major limitation in the research on the impacts of higher education, namely, confounding education with other factors, such as income, ability and so on (Gurin, in Withey, 1971). It remains unclear whether education is causing the change or whether innate abilities of the individual, family income, or other factors are really responsible. Although researchers sometimes are able to hold family income constant, it is not possible to do this with all the confounding variables. It is particularly difficult to screen out the effects of ability, and it has been suggested that since the brightest individuals attend college, it is their ability rather than the college education which leads to impact and change.

Most of the studies referenced here indicate that college educated people do more or less of a given activity without seeking to prove causality. Nevertheless, the assumption is made here (as the researchers made) that higher education in some manner causes the changes.

In each of the four sections (impact areas), the research findings are summarized and presented as an overview of available research rather than a definitive analysis of all research. Where relevant, weaknesses or omissions in research are discussed.

The report is intended for two audiences: 1) colleges and universities interested in learning about the impact they have on society, both for their own purposes and for public relations, and 2) scholars in higher education who might find this report a useful summary of current research.

Because the primary purpose of higher education is indeed to educate students, this report opens with the impact of higher education on students.

A. INDIVIDUAL IMPACTS

The most obvious place to look for the impact of colleges is the students. Clearly, colleges have every hope and expectation of changing students in some way, and expect that these changes will persist after graduation. These expectations are generally realized.

There are two widely accepted methods of researching this question. Tests are given regularly to both freshmen and senior classes, or to the same cohort during the freshmen and senior years, to ascertain the differences between the two groups. Occasionally, controls are accomplished by testing individuals in the same age group who have not gone to college to verify that the changes are due to college attendance and not merely to the effect of being four years older. In general, these controls show that while some changes are indeed due to the maturation process between eighteen and twenty-two, the changes are more pronounced in those who attended colleges than those who did not.

The second method of research consists of looking at demographic data and comparing those who have gone to college with those who have not. This method is subject to the criticism of confounding intervening variables discussed earlier. For example, college graduates may have a higher income than non-graduates because they come from a higher socio-economic class, or because they had greater innate ability before they attended college. These concerns can be answered partially in two ways.

First, some of the confounding variables, such as income, are themselves partially influenced by education, so that an indirect effect of education exists even if the direct effect were caused by something else. For example, people with higher incomes are healthier than those with lower incomes because they can afford better nutrition, preventive medicine, and so forth.

People with college degrees are also healthier. Because those with college educations also tend to have higher incomes (and vice versa), the two variables confound each other. Thus, it is not clear which variable is causing the better health. However, since college education leads to greater income, it is an indirect cause of better health to some degree. Secondly, these studies use very large samples (in the thousands), so that the other variables would tend to be assigned on a random basis to both the college and non-college educated. Therefore, the variables would be cancelled out, leaving education as the controlling variable. As long as it is understood that these data refer to the general population and not necessarily to individuals, the information should not be misleading.

1. Cognitive Impacts

Not surprisingly, people who have attended college know more than people who have not. Studies in this area were conducted on current students--not alumni. No studies were found comparing what alumni know as to what college students know. Bowen suggests two reasons for the lack of research. First, it is difficult to test alumni, since there will be intervening factors after graduation which will undoubtedly mitigate the effects of education. Second, studies show that approximately fifty to eighty percent of facts learned are lost soon after taking the course if the information is not actively applied. Therefore, these studies are likely to show that alumni actually know fewer facts than seniors (Bowen, 1977).

In the area of cognitive skills, both verbal and quantitative, alumni are

shown to be more adept than students (Bowen). Those people with a college education retain more of what they learn than those without. It therefore appears that colleges are indeed attaining their goal of teaching learning skills, in addition to teaching facts.

2. Economic Impacts

Economists have calculated both public and private rates of return on investment in education. Public rates of return refer to increases in the gross national product, and will be discussed in a later section. Private rates of return refer to the increase in income a student will make during his lifetime because of his college education, compared with his investment in that education, i.e. tuition and lost income. It is still true that college graduates make more money than those without degrees, although the differential may not be as high as it once was. The rate of return decreases as the level of education increases, mainly because of the greater amount of foregone income. The private rate of return for undergraduate degrees is estimated at eleven percent, for doctorates at four percent (Juster, 1975). (Most of the studies assume that graduate students do not work at all; to the extent that this is not true, the rates of return for graduate studies should be increased.

College graduates are also less likely to be laid-off than non-graduates. Furthermore, they are not only paid more per hour, but also work more hours in any given year. Thus, college education has a double positive effect on income.

There is also some evidence that college graduates are more efficient consumers. Even with the same income, college graduates are "wealthier" than non-graduates because they make better use of their resources.

The aggregate effect of these individual impacts clearly affects the economy as a whole. Analysis of the impact of higher education on the macro level will appear in the section on the national economy.

3. Political Attitudes

College graduates tend to be more liberal and tolerant than non-graduates (Gurin, in Withey, 1971). Some of this is due to the maturation process, but the changes are more marked in college attendees than non-attendees. College graduates are more likely to reject blatant racial stereotypes, although they are also more likely than non-graduates to favor informal discrimination in some areas and to reject intimate contacts with minority group members.

College educated individuals are more likely to reject all forms of traditional authoritarianism, such as traditional religion. While this is almost certain to have societal impacts, such attitudes are virtually impossible to measure.

College graduates are more likely to vote and to become involved in the political process (Taylor and Wolfe, in Withey, 1971); also, they donate more time and money to political campaigns. This may mean that the attitudes of college graduates are more likely to prevail even if they are not in the majority. This in turn may have political implications if those in the majority feel disaffected from the political process. Non-college educated people may believe that the political process is not representative of their views and lose faith in it. This may lead to even more withdrawal from the political process, resentment toward those in power, or recourse to other methods of affecting social change.

4. Savings

Holding income constant, college graduates save a higher percentage of their income than non-graduates (Juster). They also tend to invest in riskier, higher yielding investments, often resulting in more profit from their investments. Because of their increased savings, they are less likely to go on welfare in bad economic times. (Also, because their employment tends to be steadier, they are less likely to be unemployed in the first place.)

5. Future Orientation

College graduates are more oriented toward future concerns than non-graduates. One should be very cautious about drawing conclusions from this statement, however, because the direction of the causation is not clear. An individual needs to have a certain amount of future orientation just to decide to attend four years of college. Still, it is unlikely that college attendance decreases future orientation, so that it can be tentatively concluded that higher education is indeed related to future orientation.

Future orientation manifests itself in both risk taking and risk avoidance. As mentioned previously, college graduates are more likely to invest in higher risk securities. Conversely, however, college graduates are more likely to wear seat belts, seek preventive medicine and save. All of these behaviors have important societal consequences.

6. Crime

As might be expected, college educated people commit fewer property crimes, e.g., theft, burglary (Ehrlich, in Juster, 1975). They do commit more of certain kinds of crimes, such as embezzlement, but that is largely due to the assumption that people in a position to commit embezzlement needed higher education to reach that level.

The link between education and crime appears to be jobs. Education enhances job opportunities and those who work are less likely to commit crimes. There are alternative explanations for this. One is that people who work feel that they are a part of society, and thus have an interest in upholding its ethical norms. An economic point of view posits that crime should be considered just another occupation, with advantages and disadvantages. Education aids one's likelihood of success in legitimate activities more than illegal activities. The major disadvantages of illegal activities, arrest and conviction, prohibit individuals from continuing to engage in legal occupations but not illegal ones. Therefore, the disadvantages of criminal activity rise steeply with increased education.

Substantiation of the concept of crime as an alternative occupation is found in the education statistics of the U.S. prison population. Although whites have a higher education level than non-whites in the general society, that statistic is reversed in the prison population. Non-whites in prison, male and female, have a higher education level than whites in prison. Because job opportunities are often fewer for non-whites, they are more likely to consider crime as an alternative occupation.

7. Lifelong Learning

College graduates continue to receive more education after graduation than non-college graduates (Schultz, 1971A). This education is often informal, such as on-the-job training, but it nevertheless enhances and develops skills. College graduates not only start ahead in training and skills, they also stay ahead.

8. Media

Those people with more education rely more on the print media for their news and less on the broadcast media. Interestingly, the increase is not so much in newspapers as it is in magazines and books (Robinson, in Withey, 1971).

College educated people watch television somewhat less than non-college educated people. What they watch, however, is surprisingly similar (Robinson, in Withey, 1971).

9. Women

College educated women have fewer children than non-college graduates, and they have more control over the spacing and frequency of their children (Liebowitz, in Juster). They spend fewer hours on household maintenance activities, such as washing and cleaning. It is theorized that because the husbands of educated women have more income, they can afford to buy rather than produce. College educated women spend more time in child care, however, both per child and in absolute terms. The husbands of college educated women spend more time with children, as do other child care workers, so the woman's time is in addition to, not in lieu of, other time.

The more education a woman has, the more likely she is to work both before she has children and after they become teenagers. While her children are growing up, however, her rate of working is the same as, or slightly less than, non-college educated women. It is clear that women do not consider market substitutes as acceptable when it concerns their children (Leibowitz, in Juster, 1975).

10. Summary

There has been a fair amount of research on the impact of college on students. Much of the research consists of comparing college and non-college

people and assuming that the differences are due to the college experience. A few studies have followed students throughout their four years of college to trace their development, but they (e.g., Perry, 1980) are concerned with affective, or ethical, development and were not included in this report.

College education is still a good investment, although not as good as it used to be. College educated people are generally healthier, make better consumers and more active citizens.

In addition to its many impacts on individuals, higher education affects the country as a whole. The second section of this report deals with the impacts of higher education on the national economy.

B. NATIONAL ECONOMIC IMPACT

The information available on the impact of higher education on the national economy is not as specific as that on student outcomes, for obvious reasons. The impact of higher education is often delayed for several years, as recent graduates do not realize the economic benefits of college graduation for several years (National Center for Education Statistics). Additionally, there are even more variables which affect the national economy than affect students, so that the impact of higher education is difficult to isolate. Nevertheless, some broad generalizations can be made.

Schultz (1971B), in his Investment in Human Capital: The Role of Education and of Research, was the first to propound the human capital theory, which forms the basis for much of the research and theory on the impact of education on the national economy. Schultz hypothesized that people should be thought of economically, as another form of capital. The concepts normally applied to capital, such as investments and depreciation, he held, could be applied to people as well. Thus, using this analogy, investing in education

would be another form of capital formation. Schultz recognizes that this certainly is not the end of the discussion about people, but that it is an economically valid way of considering human contribution to productivity.

Support for Schultz's theory comes from the repeated observations of many economists that the rate of productivity is rising faster than the rate of resources devoted to it. A gap has been observed in increased productivity which economists could not explain. Schultz posited that the increase was due to the better training and better skills of workers. These increases in skills via lag time are attained over long terms rather than short terms. It was estimated that approximately 20% of the increase in the U.S. gross national product between 1929 and 1957 was due to such "advancement of knowledge." Approximately 40% of the per capita income gain during that time was also due to the advancement of knowledge.

Viewed in terms of human capital development, the question becomes one of comparing returns on investment in education compared with investment in other areas. Although the figures vary a great deal from author to author, education fares reasonably well. (The models used in this type of research are econometric and thus not easily understood by non-economists.)

In the 1960's, it was estimated that the rate of return for white male college graduates was slightly less than 15% after taxes. The overall rate of return in the U.S. private economy was 13.3% before taxes, so higher education was a better than average social investment (Schultz, 1971A). More recently, the rate of return for higher education was estimated at 10 to 15 percent (Juster, 1975). As explained previously, the estimates assume that college students are not working, and at least half of the investment figures include foregone earnings. To the extent that students are working, the rate of return is very much understated. Although figures are not available for more

recent years, experts estimate that society's investment in college education has yielded returns equivalent to or in excess of other capital investment.

There are other aggregate impacts of higher education on the economy which are unmeasured--and are perhaps unmeasurable. For example, because college-educated people tend to seek preventive medicine, their health care costs are lower. Because college educated people tend to use seat belts, they are less prone to be injured in car accidents; and again, health care costs are lower. In both cases there is less time off from work, and therefore less loss of productivity. College educated mothers spend more time with their children and presumably, some of this time is spent educating their children. Education at this level is very productive in terms of return on investment, that is, an eventual monetary return.

A recent article in the Chronicle of Higher Education reported an increase in interest in measuring education's impact of growth. A panel of the American Economics Association noted that the human capital theory became dormant in the 1970s, but that once again the time for further research may have arrived once again'(Scully, 1993).

Summary

There is a considerable amount of literature on education & productivity, most of it in the vein described above. However, since it is written by economists for economists, it is of limited utility for the layman. Despite the difficulty in readily applying econometric models to higher education impact studies, it seems clear that there are quantifiable impacts. Individuals receive a positive rate of return from their investment in their education. Society receives a competitive rate of return from its investment in higher education. Much of the increase in the gross national product is due to investment in higher education. The following chapter addresses the question of regional or local impacts.

C. LOCAL/REGIONAL ECONOMIC IMPACTS

1. Economic Impact Studies

In contrast with the research on the impacts of higher education on the national economy, this area has been relatively well-researched. Following the development of a model for estimating economic impacts by John Caffrey and Herbert Isaacs for the American Council on Education (1971), many colleges and college systems conducted their own impact studies. Miller and Erwin in 1981 surveyed higher education boards, community college boards and private college associations to determine to what extent impact studies had been conducted. They found that 27 state-level studies had been completed. Of these, four were state-wide studies conducted by state higher education agencies, and 23 were system-wide studies. The systems studies included economic impact studies by community college boards, state higher education agencies, private college associations, and a few by private individuals. In all, at least 700 institutions were assessed. (Some system-wide studies did not indicate how many institutions were included.) Of these studies, many were based on the aforementioned Caffrey-Isaacs model (Miller and Erwin, 1982).

The Caffrey-Isaacs model is basically a cash flow model. To measure direct impact, it considers how much money flows into the community from the college, minus the expense to the community of the college. The model then advocates use of a multiplier to calculate indirect impact. Examples of money flowing to the community are local purchases, salaries, money spent by visitors, and so on. One particularly interesting item is the money held in savings banks by the college itself ard college employees. Because of Federal Reserve requirements and banking practice, banks are required to have a certain amount on deposit to act as collateral for loans. It is then possible to calculate how much more in business loans a bank can make because of college and employee savings.

Conversely, however, colleges are a financial burden to local communities in at least two ways. They are exempt from paying property taxes, which reduces the tax base for the community. Further, colleges require services such as crime prevention and fire protection. While faculty, staff, and some students do pay property taxes on land they own or rent, students in dorms do not contribute to that tax pool. The Caffrey-Isaacs model provides formulas for calculating the college burden to the community, costs which need to be subtracted from the positive economic impacts calculated above.

Once this burden is subtracted from the college benefit, a net direct impact figure emerges. In all the studies conducted the college benefit far outweighed the burden.

Having identified a supposedly positive direct economic impact figure, a multiplier is used to calculate indirect impact. Indirect impact assesses the chain of transactions and economic activities that flow out of expenditures resulting from people spending their money in a given community. Each expenditure sets off a chain of transactions which add to the economic effect. Generally, multipliers for a given community can be supplied by the local Federal Reserve, or a state Chamber of Commerce. Caffrey and Isaacs recommend multipliers of 2.5 to 3.0 for colleges. For example, the average direct impact of the system-wide studies reviewed by Miller and Erwin was $625 million. A multiplier of 2.5 would mean that $1.56 billion was returned to the local economies.

Regarding the impact studies cited earlier, several state higher education agencies conducted state-wide impact studies in cooperation with local institutions. This enabled the agencies to calculate impacts both for the impact of higher education on the state as a whole, and for the impacts of institutions in their local communities.

With respect to the state level, the multiplier for state impact is larger than the one used for local impact. The reason for this is that there is less "leakage" in the larger state economy; that is, a larger fraction of the college impact money is likely to be spent in a state rather than in a local district because the state has a larger, more diverse economy. Therefore, an economic impact study taking into account an entire state will yield a larger figure than a sum of local economic impact studies would. Conversely, however, the state economy is so much larger that the impact of higher education will account for less within that arena.

Impact studies are conducted for a variety of reasons. Clearly, these studies take a great deal of time and effort; institutions are more likely to donate that time if they receive benefits in the form of local impact statements in addition to a state-wide impact statement. In their study, Miller and Erwin asked respondents what they considered to be the benefits of an economic impact study. Most of the responses could be coded into two categories: 1) public relations, and 2) planning.

Many of the studies were conducted by colleges or states feeling pressures from local communities about the burdens of the college. Typical among the complaints is that the colleges pay no taxes yet require extra services. Thus, economic impact studies are conceived to demonstrate that the college generates enough business in the local community to compensate for the tax loss and pay, albeit indirectly, for needed services. Since all of these studies demonstrate that the collegescontribute more resources to the community than they utilize, they have been effective tools in public relations in that respect.

One weakness in some of the impact studies is the fact that they do not deduct "burdens" from the impact, such as the need for more schools. It seems

to be poor policy not to account for college burdens since it opens the school to the potential charge that the study is sloppy at best and dishonest at worst. The original Caffrey-Isaacs model indeed provides for such deductions, and still proved that colleges have a healthy economic impact.

Many of the respondents in the Miller and Erwin study also indicated that the studies would be useful for planning purposes, specifically: a) calculating the impact of changes in college policy, and b) calculating the impact of a college closing.

An example of the use of impact studies to calculate college policy changes would be to assess the impact of a decision to admit more in-state or in-district students than before. The spending of local students is not included in impact studies on the assumption that these students would be living and spending money in the area regardless of whether the college was there or not. Therefore, out-of-state students are expected to add more to the local economy than in-state and in-district students. A college, or a state, could thus calculate the economic impact on the local and state economy of a policy decision to admit more in-state and fewer out-of-state students.

Consequently, a state could calculate the economic impact of closing a college. Some colleges, located in rural, sparsely populated areas, are the largest local employer and the largest purchaser of local items. Closing such a college might cost a state more in lost revenues, lost tuition and increased payments for unemployment than it would save in state funds. Consequently, local business leaders might be convinced to support the college politically if they knew what the impact of closing would be on their businesses.

2. Michigan Economic Impact Studies

Two economic impact studies have been completed in Michigan. One calculated the impact of 34 independent Michigan colleges and universities in 1980-81. It was conducted by the Association of Independent Colleges and Universities of Michigan. The total impact was calculated to be $2.4 billion, including $263.5 million in college revenues, $131 million in student expenditures (in addition to the previous college revenue figure), and $53 million in money spent by visitors to the colleges. These three figures were multiplied by a multiplier of 2.25 (recommended by the Michigan Department of Commerce) for totals of $659 million in college revenues, $295 million in student expenditures, and $119 million in visitor expenditures. In addition, the impact total included a savings to taxpayers of $129 million representing the difference in state subsidies to public as compared to private institutions. Finally, the study added $1.2 billion in increased annual earnings for graduates with a college degree.

Of the aforementioned items, savings to the taxpayer do not seem to be properly included in the impact assessment. Because the state does not subsidize private colleges at the same level it subsidizes public colleges, tuition for students and their families is higher. Were the state to spend the $129 million cited by the study on subsidizing private schools, tuition would be lower and, one could argue, students would have more disposable funds. Conceivably, this money would be spent in the state for other purposes, thus adding to the economic development of the state. (Probably private colleges would not lower tuition dollar for dollar for an increase in state subsidies; so, assuming full state subsidies of $129 million, it is unlikely that students would have an extra $129 million to spend. While there might be an economic impact due to decreased state subsidies, it is certainly not of the magnitude of $129 million.)

A second study was conducted under the sponsorship of the Michigan Community College Association. It calculated the state economic impact of the Michigan community colleges. The MCCA rejected the Caffrey-Isaacs model because it was only a short-term cash flow model, and did not consider the long-term effects of the occupational training conducted by the colleges; they preferred a human capital model. Consequently, the MCCA concentrated on the numbers of students educated by their colleges, and found that the colleges enrolled over 233,000 students, 40% of all Michigan higher education students. Of these, over 30,000 were enrolled in work-related courses paid for by their employers. Over 2,500 employers paid for their employees to take courses in the Michigan community colleges. Abstaining from the use of hard dollar figures, the study "proved" that the development of human capital will contribute to an improved economy and thus an economically healthier state.

3. Alternative Uses

One area not addressed in impact studies is the alternative uses to which college land and money could be put. If a locality had a "clean industry" (e.g., a computer manufacturing company) instead of a college, its revenues and the spending of its employees might generate as much income as the college. The business would, of course, also pay taxes. Comparing business and colleges with equal numbers of employees, however, understates the financial impact of colleges. Colleges have students (their "products") whose local spending adds to the local economic impact.

4. College Burdens on Local Community

In addition to the positive impacts discussed previously, colleges also generate negative impacts. Laub conducted a study of the negative impacts of

a college on a small, rural community. He identified the following items as burdens to the community: 1) community services, 2) traffic congestion and parking, 3) tax exemption of college land, 4) demands on local housing, and 5) police, fire and refuse disposal service. In numbers, he estimated that every incremental increase of 1,000 residents requires: a) 4.8 elementary and 3.6 high school rooms, b) 100,000 gallons of water, c) 1.8 policemen and firemen, and d) 8.8 acres of land for schools and recreation areas.

He also claimed that there were other significant negative non-monetary impacts from colleges. Insufficient dormitory space often leads to crowding of the local housing market, leading to neighborhood decay. Eventually this results in the monetary cost of repairing the neighborhood. In addition, he points to socio-cultural differences between the local residents and the faculty and students who move to the community because of the college. The local community views the challenge to its ethical norms and traditional practices as an extremely negative effect of having a college in its community. This is particularly true when local youths begin to adopt college values.

Laub cites some advantages of having a college in a locality. Local purchases can aid the local economy. In order to realize this potential, it is necessary that local businesses be developed sufficiently to fill college and student needs. Otherwise purchases go outside the community while the community is left with the burden.

Laub also confirmed the statement made previously that college-educated people are more likely to participate in government than non-college educated people. He states that in small communities where the college professional staff is a significant proportion of the labor force, their influence on the local system is high. This influence is direct (e.g., participation on local school boards, leadership in civic organizations), and indirect (e.g., parental influence, spending habits).

5. Colleges as a Resource

In addition to direct monetary impacts, a college aids the local economy as a resource. Presumably, one of the benefits of a college or university is the supply of expert advice to a local community. A study by Bugliarello and Simon (1976) on the influence of the engineering schools in the state of Illinois on the surrounding communities found that although the engineering faculty was a source of information, it was not utilized to its potential.

The engineering faculty made themselves available to answer questions of a technical nature. Occasionally, engineering students would become involved in a local business problem as a class project. Thus, although the "pure" research conducted by college professors has important financial implications for the country as a whole, the regional impact remains unclear.

According to Bugliarello and Simon, Illinois engineering professors spent an average of 13.8 days per year consulting. Of these, 9.25 or 66% were spent consulting for private businesses, and 4.62 days or 33% on consulting for governments. For the governmental days, far more time was spent on national government consulting rather than for state or local governments. Local governments list universities as the third most heavily used resource; 60% of the local governments report that they use university personnel for technical advice.

There was very little formal contact between members of Illinois state government and Illinois engineering faculty, although the engineering faculty stated that they were willing to aid state government. No explanation for the lack of contact was given.

6. Research Employment Effects

The University of California determined that "one good Ph.D. can provide jobs for anywhere from 10 to 100 less highly educated employees" and claimed

that this was the reason why so many businesses were locating near universities (Bugliarello and Simon). The authors cautioned, however, that this effect may be the result of employees moving from one part of the region to another rather than the creation of new jobs.

7. Regional Mobility of Students

Colleges and universities act both as portals into and out of a region. Clearly, colleges attract students who come to study, find permanent employment, and settle in the region. Conversely, local students who attend the colleges are then able to move out to other regions. College graduates in the Northeast are three times as likely to move as high school graduates, and thus one could conclude that colleges have a negative regional impact since they enable the most talented youth to leave the region.

Ratios of in- versus out-migration vary from region to region. One study reported that New England exported one-third of its Ph.D.s, and the Midwest exported one-fourth. The West had 20% more first jobs for Ph.D.s than the number it trained, and the South had 80% more first jobs (Bugliarello and Simon). Wenkler (1973) reported that Michigan exported 24.8% more Ph.D.s than it imported between 1957-1967. Therefore, Michigan is bearing the cost of training Ph.D.s for other regions of the country, a negative economic impact indeed.

8. Summary

Many studies in the mode of the short-term cash flow models have been conducted. These studies show that a college generates more income and related taxes than it uses in services and tax exemptions. Colleges have not been compared to similar sized businesses, so it is not proven that they are

the most optimal use a region could make of the land and its resources. Thus, they may not be the drain upon the local economy that local governments often claim they are, unless an institution is located in a very rural area. In that case, the college and its employees do much of their purchasing outside the local community, while the local community is still responsible for the services.

Colleges attract students to a region and give them an opportunity to leave it. Much of this, of course, depends on the economy in the state, so degrees of out-migration cannot be attributed to higher education institutions alone.

As stated previously, not much research is available on the impacts of higher education on the country as a whole. However, by extrapolating from related research, some inferences can be made. The next section deals with such issues.

D. SOCIETAL IMPACTS

This section briefly touches on the areas of national life as compared to the national economy which are affected by higher education. With the exception of the human capital estimates of the effect of higher education on the national economy, there have been no studies of the effect of education on the country as a whole (Juster). Nevertheless, some projections can be made based on the results of other studies.

1. Productivity

Educating people to their full potential enables them to work to their full potential. This increases the productivity of the country as a whole, and enables the nation to get more return per dollar invested. There are also

non-economic returns, in that people can work shorter hours for the same result, thus freeing up people for more leisure time. Presumably, people are healthier because they need work fewer hours, and happier because they can spend leisure time on family and hobbies.

2. Resource Use

This is related to productivity. People who work more efficiently will also use resources more efficiently. Further, it was found that college educated people make better use of resources in their homes than non-college educated people.

More efficient use of resources is an end in itself, and in addition, leads to a greater return on investment so that the country benefits both in monetary and non-monetary terms.

3. Crime

It was reported earlier that college educated people commit fewer crimes than non-college educated people. Interestingly, however, studies show that higher educational levels of the community show a significant and positive influence on the effectiveness of law enforcement so as to reduce the rate of criminal activity (Ehrlich, in Juster). One can speculate that college educated people are more sophisticated and less likely to allow themselves to be victimized. Another theory may be that a highly educated community creates a milieu where the reporting of and apprehension of crime is valued so that a criminally minded individual would perceive that his/her chances of arrest and conviction would be so high that s/he would be discouraged from committing a crime.

Thus, there are economic implications in a decreased crime rate, as well as non-monetary benefits in terms of the increased safety for and trust of citizens.

4. Education

Juster proposed a theory of "educational capital" which is passed from one generation to another. His theory is that some of the benefits of education are transferable and that the return in investment in education should take into account the capital transferred to the next generation. As college educated women spend more time with their children than non-college educated women, much of this educational capital is indeed transferred.

Juster's theory receives support from studies showing a strong relationship between years of parental education and student reading scores for black males (Bowles, in Winkler, 1970) and white males (Winkler, 1972). It is not stated whether the Bowles study was controlled for ability, while the Winkler study was controlled. Thus, parental education contributes to a child's learning ability above and beyond the child's innate ability.

Further, the individual effects of high reading scores are aggregated into group effects (Winkler). Being in a school group composed of 45% in the low socio-economic status group as opposed to only 15% in the low socio-economic status group lowers the reading achievement levels of black students by 14 points and those of white students by 22 points. Thus, one may calculate that increased education has a cumulative effect not only in this generation but in succeeding generations. Conversely, a decrease in educational effort today would be felt in years to come.

5. Scientific Superiority

At least until recently, the United States was clearly the scientific leader of the world. In fact, some statistics claim that between 1940-1949, 88% of the major inventions and discoveries originated in the United States. Ben-David, a sociologist and educator, notes that of the fifty most significant industrial inventions in the 20the century, 22 were developed entirely in the United States and another 13 were developed in the United States and one other country.

It cannot be stated with certainty that this scientific superiority is due to American higher education. Nevertheless, the United States is the only industrialized nation which has located its major research effort in colleges and universities. Although not quantified, it seems clear that there is a relationship between higher education research effort and American scientific superiority.

6. Summary

With the exception of economic effects, not much research is available on the impact of higher education on the country as a whole. It is a difficult area of study because of all the almost unlimited number of intervening variables. For example, there are many factors in addition to education which affect crime--the economy, level of police activities, and a society's ethical norms.

This would appear to be a promising area of study for higher education researchers. Before research can begin, however, researchers need to postulate appropriate theories and develop methodologies suited to test those theories. The process will likely prove to be time consuming and arduous, but rewarding. As always, the very definition of what constitutes "impact" was the first stumbling block.

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